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EXAMINER

SCHECHTER, ANDREW M

ART UNIT

PAPER NUMBER

2871

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/603,124

Applicant(s)

TILLIN ET AL.

Examiner

Andrew Schechter

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15, 17-21 and 23-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-15, 23-32 and 34 is/are allowed.
- 6) ☒ Claim(s) 17-21, 33 and 35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed 5 January 2005 have been fully considered but they are not persuasive.

The applicants have amended claim 33 and added new claim 35 reciting  $\gamma = \pm 45^\circ$  and  $\gamma = \pm 55^\circ$ , respectively; the claims also omit the recitations of specific values for the retardations from previous claims 17 and 20. Considering whether the recited limitations are by themselves allowable has caused the examiner to reassess the previously indicated allowability of the original claims, as discussed below.

The applicants have amended claim 19, in part by removing the third equation. From *Kwok* '358, the examiner understands that the three equations represent the conditions under which the output light will be linearly polarized. It is not clear to the examiner what the equations would mean if the third (deleted) equation were to be not satisfied by a device. Is there any guidance in the specification, or can the applicant provide an explanation, of what the two equations mean when the third one is not satisfied? What device is envisioned by this claim?

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 19 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a device which satisfies  $2\theta = \gamma \pm \pi/2$ , does not reasonably provide enablement for a device in which this condition is violated. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

As discussed above, the specification discusses a device in which these three equations are satisfied, and [compare the discussion of *Kwok '358* in the Office Action of 5 October 2004] the equations taken as a set are comprehensible. The specification does not appear to give guidance on how to make or use a device in which the third equation of the set is violated. Can the applicant please provide clarification, with reference to the specification, of what a violation of the third equation would indicate?

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 17, 18, 20, 21, 33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Wu*, U.S. Patent No. 5,933,207 in view of *Kwok et al.*, U.S. Patent No. 6,633,358.

*Wu* discloses [see Fig. 2, for instance] a display comprising a polarization rotator for rotating a polarization direction of linearly polarized input light by an angle  $\gamma$  different from  $90^\circ$ , comprising a first input alignment surface [34], a second output alignment surface [38], a layer of liquid crystal material having a liquid crystal director and being disposed between the said alignment surfaces, said rotator having a mode in which a  $90^\circ$  twist of said liquid crystal director is induced across said layer [col. 5, line 10ff.], the layer having a retardation of  $\Delta n \cdot d \sim 0.25 \mu\text{m}$  [col. 5, line 62], so  $\Delta n \cdot d / \lambda \sim 0.45$  for light with  $\lambda = 550 \text{ nm}$ . The angle between the polarization direction of the input light and an alignment direction of the first alignment surface (called  $\beta$  in *Wu*) is "on the order of  $20^\circ$ " [col. 5, line 44], so  $\theta \sim 20^\circ$ . Comparing these numbers with Fig. 1 of the specification, with  $\gamma \sim 130^\circ$  or  $-50^\circ$  and  $\Delta n \cdot d / \lambda \sim 0.45$ , we see that these values fall substantially on the lines given by the set of equations recited in claims 33 and 35.

*Wu* does not explicitly disclose the final, amended limitations of claims 33 or 35, that  $\gamma = \pm 45^\circ$  or  $\gamma = \pm 55^\circ$ , respectively. Instead, *Wu* discloses [col. 5, lines 31-64] that  $\theta$  is "on the order of  $20^\circ$ ", and comparing with the third equation [this set of equations is separately disclosed by *Kwok* as governing the behavior of the light going through this device, as discussed in the Office Action of 5 October 2004], this corresponds to  $\gamma \sim -50^\circ$ . *Wu* gives further guidance on what the value of  $\theta$  is, saying that its invention differs from prior birefringence cells where  $\theta$  is typically  $45^\circ$  [corresponding to  $\gamma \sim 0^\circ$ ], and "the optical efficiency is maximized" for  $\theta$  "on the order to  $20^\circ$ ". From this, the examiner understands that the disclosed range of  $\theta$  is near  $20^\circ$  and substantially

different from  $45^\circ$  [so the disclosed range of  $\gamma$  is near  $-50^\circ$  and substantially different from  $0^\circ$ ]; and further, the value of  $\theta$  should be considered to be a result-effective variable, whose optimization would have been obvious to one of ordinary skill in the art at the time of the invention [see MPEP 2144.05]. Therefore, the claimed values of  $\gamma = \pm 45^\circ$  or  $\gamma = \pm 55^\circ$  are either within the range disclosed by the prior art [“on the order to  $\gamma \sim -50^\circ$ ], or close enough that one skilled in the art would have expected them to have the same properties; thus a *prima facie* case of obviousness exists [see MPEP 2144.05]. Also, to the extent that  $\gamma = \pm 45^\circ$  or  $\gamma = \pm 55^\circ$  are considered optimal values by the applicant, it would nonetheless have been obvious to one of ordinary skill in the art at the time of the invention to optimize this value, given its status as a result-effective variable, discussed above; so again a *prima facie* case of obviousness exists [see MPEP 2144.05]. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use these values in the device of *Wu*. Claims 33 and 35 are therefore unpatentable.

Claims 17 and 20 recite the additional limitations that  $\Delta n \cdot d / \lambda = 0.487$  or  $0.55$ , respectively. *Wu* discloses “a permissible range of  $0.2 - 0.8$ , with a preferred value on the order of  $0.5$ ” for “successful operation of the invention” and “maximum optical efficiency” [col. 5, lines 59-64]. As above, the claimed values are within the disclosed range, and optimizing them would have been obvious to one of ordinary skill in the art at the time of the invention. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use the recited values in the device of *Wu*. Claims 17 and 20 are therefore unpatentable.

Claims 18 and 21 recite the additional limitations that  $\theta = -\pm 22.5^\circ$  or  $\theta = -\pm 17.5^\circ$  respectively. As discussed above, it would have been obvious to one of ordinary skill in the art at the time of the invention to use these values in the device of *Wu*. Claims 18 and 21 are therefore unpatentable.

6. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Kwok*, U.S. Patent No. 6,341,001, in view of *Wu*, U.S. Patent No. 5,933,207, and further in view of *Kwok et al.*, U.S. Patent No. 6,633,358.

*Kwok '001* discloses [see Figs. 1 and 2-2] a polarization rotator for rotating a polarization direction of linearly polarized input light by an angle  $\gamma$  different from  $90^\circ$ , referred to as the MTN mode, the rotator having a mode in which a  $90^\circ$  twist of the liquid crystal director is induced across the said layer [see Fig. 2-2]. Fig. 2-2 is drawn for  $\theta = 15^\circ$ , but as can be seen from Figs. 2-1 through 2-4, the properties of the modes change slowly as the angle  $\theta$  is varied. These figures are therefore understood by the examiner as disclosing a range of values of each parameter for which a particular mode operates, with these parameters available to be varied to optimize the device. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use  $\theta = 12.5^\circ$ , which is a value within, or at least sufficiently close to, the range of values disclosed by the reference as giving an operational MTN mode device [see MPEP 2144.05].

*Kwok '001* may or may not disclose the following structure: a first input alignment surface, a second output alignment surface, a layer of liquid crystal material having a liquid crystal director and being disposed between the said alignment surfaces. If not,

*Wu* does disclose it and it would have been obvious to one of ordinary skill in the art at the time of the invention to use it, motivated by the desire to make a functioning liquid crystal device.

*Kwok '001* discloses [see Fig. 2-2] that for a 90° twist angle, the range of  $\Delta n \cdot d$  is about 0.1 - 0.4, or  $\Delta n \cdot d / \lambda \sim 0.2 - 0.7$  for light with  $\lambda = 550$  nm. *Kwok '001* does not necessarily disclose that the two equations in claim 19 are satisfied. *Kwok '358* disclose the same set of equations [as well as the deleted equation; see the discussion in the Office Action of 5 October 2005] and teaches that satisfying these conditions are the conditions under which input linearly polarized light will emerge as output linearly polarized light (rather than elliptically polarized light) which can then be put through a polarizer and achieve the maximum contrast on the output [*Kwok '358*, col. 6, line 61ff, for instance]. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to satisfy these equations, motivated by the teaching of *Kwok '358* and the desire to high contrast in the display device (by having the output polarizer receive linear rather than elliptical light). As can be seen from Fig. 1 of the specification, the above values for the retardation, as well as the value of  $\theta$  and the third equation from *Kwok '358*, give rise to rotation in the range  $40^\circ \leq |\gamma| \leq 70^\circ$ . Claim 19 is therefore unpatentable.

#### ***Allowable Subject Matter***

7. Claims 1-15, 23-32, and 34 are allowed.



8. The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not disclose the device of claim 1, in particular the additional limitation (amended from the previous claim 22) that the polarization rotator has the particular range of values  $175^\circ \leq |\gamma| \leq 180^\circ$ . Claim 1 is therefore allowed, as are claims 2-15, 23, and 24, which depend on it.

Similarly, the prior art does not disclose the device of claim 34, in particular the additional limitation that the polarization rotator has the particular range of values  $175^\circ \leq |\gamma| \leq 180^\circ$ . Claim 34 is therefore allowed.

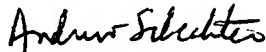
The prior art does not disclose the device of claim 25, in particular a parallax barrier comprising the polarization rotator recited in the original claim 1. The nearest prior art, *Morishina*, was discussed in the Office Action of 5 October 2004. Claim 25 is therefore allowed, as are its dependent claims 26-32.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
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17 March 2005